

REMARKS

Applicant seeks reconsideration of the application. No claims have been canceled, two claims have been added and two claims have been amended. Accordingly, Claims 28-34 are pending.

I. Claims 28-30 Rejected Under 35 U.S.C. § 103

In the Office Action, Claims 28-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakaguchi et al. (U.S. Patent No. 5,966,620) in view of Applicant's acknowledged prior art figure 2 (FIG. 2). Applicant respectfully traverses this rejection.

Claim 28 recites an apparatus comprising a first single crystal substrate portion having a dielectric layer on a surface, which is bonded to a device surface of a second substrate portion. More specifically, the claimed apparatus requires active devices formed on the second substrate portion and selected ones of the active devices of the second substrate portion are intercoupled via metal lines.

Sakaguchi does not teach or suggest the above-cited limitations. Sakaguchi discloses a process for producing a monocrystalline semiconductor on a dielectric-isolated or insulative material and a monocrystalline compound semiconductor on a semiconductor substrate. However, as correctly noted by the Examiner, Sakaguchi does not teach or suggest a second substrate portion having active devices formed thereon and defining a device surface.

Background section and FIG. 2 of the present specification also does not disclose or suggest the above-recited limitations. As described in page 4 of the present specification, prior to the present invention, the second layer of active devices (transistors) is not made of a single-crystal silicon but is made of a polycrystalline silicon or amorphous silicon because fabrication of a second layer of active devices made of single silicon crystal requires processing steps that are

performed well beyond the temperature that the interconnect system (e.g., metal lines interconnecting the transistors) can withstand. Accordingly, prior to the present invention, an attempt may have been made to construct a second layer of active devices made of single silicon crystal; however, such structure could not be properly fabricated because the metal lines coupled between the active devices become damaged by heat during the fabrication process.

In the Office Action, the Examiner asserts that "it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include a second substrate portion having devices formed thereon and defining a device surface, as suggested by pages 3-4 of the instant application disclosure describing the prior art, in order to improve the integration and bonding of semiconductor layers including transistors." In this regard, it is not clear how the structure taught by Sakaguchi could be modified in accordance with the subject matter of Claim 28 because the background section of the present invention (section describing FIG. 2) specifically indicates that a second layer of active devices is not made of a single-crystal silicon, prior to the present invention, because of the problem associated with fabricating of such structures (see page 4, lines 4-10 of the present specification).

From the reasons and explanations provided above, it is clear that neither Sakaguchi nor FIG. 2 discloses or suggests a second single crystal substrate portion having active devices formed thereon, in which selected ones of the active devices of the second substrate portion are intercoupled via metal lines, which is what is claimed in the amended Claim 28.

In view of the foregoing, Applicant respectfully submits that Claim 28 is not obvious over Sakaguchi in view of FIG. 2 and requests withdrawal of the rejection of Claim 28. Dependent Claims 29 and 30 are submitted as not being obvious in view of the relied upon prior art at least for the reasons given in support of their base Claim 28.

II. Claims 31 and 32 Rejected Under 35 U.S.C. § 103

The Examiner has rejected Claims 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over FIG. 2 and pages 3-4 of the present application disclosure.

Applicant respectfully traverses this rejection.

Claim 31 recites an apparatus in which at least one secondary single crystal substrate is coupled to a device surface of a primary substrate having a first level of devices. Additionally, the claimed apparatus requires devices formed on the at least one secondary single crystal substrate, in which selected ones of the devices of the secondary substrate are intercoupled via metal lines.

As noted above, prior to the present invention, a second layer of active devices was not made of single-crystal silicon but were made of a polycrystalline silicon or amorphous silicon because of the problem associated with the interconnect system (metal lines) becoming damaged during the fabrication process.

In the Office Action, the Examiner contends that page 4 of the present specification discloses providing a second layer of transistors made of single crystal silicon was known in the art at the time of the present invention. Applicant respectfully disagrees because there is nothing in page 4 of the present specification that indicates that a viable method of fabricating a second layer of transistors made of single crystal silicon existed at the time of the present invention. Prior to the present invention, the present specification notes that the problem associated with fabricating of such structure prevented designers from making semiconductor devices having a second layer of active devices with a single-crystal silicon.

In view of the foregoing, Applicant respectfully submits that Claim 31 is not obvious over FIG. 2 and description thereof and requests withdrawal of the rejection of Claim 31. Dependent Claim 32 is submitted as not being obvious in view of the relied upon prior art at least for the reasons given in support of its base Claim 31.

III. New Claims 33 and 34

Applicant respectfully submits that New Claims 33 and 34 are supported by the original disclosure. With respect to New Claims 33 and 34, Applicant incorporates its prior arguments with respect to their base Claims 28 and 31. Therefore, Applicant is of the opinion that New Claims 33 and 34 are allowable over the cited references.


CONCLUSION

In view of the foregoing, it is submitted that the claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date. If there are any fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666. If a telephone interview would expedite the prosecution of this Application, the Examiner is invited to contact the undersigned at (310) 207-3800.

Respectfully submitted,

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CERTIFICATE OF MAILING:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box Amendments, Non-Fee, Assistant Commissioner for Patents, Washington, D.C. 20231 on May 1, 2002.


Linda D'Elia

May 1, 2002

Attachment: Version With Markings To Show Changes Made

Version With Markings To Show Changes Made

IN THE CLAIMS:

The claims have been amended as follows:

28. (Amended) An apparatus comprising:

a first [single crystal] substrate portion having a dielectric layer on a surface, the first substrate portion formed as a film of less than an entire portion of a starting material by demarcating a film thickness through an ion implantation into the starting material and separating the first substrate portion from the starting material; and

a second single crystal substrate portion having active devices formed thereon and defining a device surface wherein the dielectric layer of the first substrate portion is bonded to the device surface of the second substrate portion, wherein selected ones of said active devices of said second substrate portion are intercoupled via metal lines.

31. (Amended) An apparatus comprising:

a primary substrate having a first level of devices formed thereon and defining a device surface; and

at least one secondary single crystal substrate coupled to the device surface, the at least one secondary substrate having active devices formed thereon and selected ones of said active devices of said at least one secondary single crystal substrate are intercoupled via metal lines.

New claims 33 and 34 have been added.